

## **MEADOWLANDS BIODIVERSITY: WHAT DO BUTTERFLIES, ODONATES, AND FROGS TELL US?**

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Biodiversity can indicate environmental quality and its change over time. There are few published studies of American urban biodiversity. In 2006 I sampled butterflies, odonates (dragonflies and damselflies), and frogs in the Meadowlands to address MERI's interest in a long-term monitoring program. These animals are useful for comparing urban and rural areas and monitoring temporal change.

I performed frog call surveys at two freshwater sites, Teterboro Airport Woods and Guarini Tract, counting calls for 2.5 hours beginning about dusk, once each in April, May, and June. I detected only southern leopard frog, in modest numbers (ca. 15 calling males per site). Several other species have been reported but probably only American toad, green frog, and bullfrog persist. Southern leopard frog has disappeared from Long Island thus a population in the Meadowlands is noteworthy. Frog diversity in the Meadowlands is limited by the distribution of freshwater of good quality and combinations of wetland and undeveloped upland habitats. Despite low diversity, long-term frog surveys are worthwhile because frogs are sensitive to local and global ecological change. I recommend continuation of frog surveys by remote recording.

James Barbour and I performed strip transect surveys for adult odonates and butterflies in late June, once each at five sites (Kearny Marsh West, Disposal Road, Laurel Hill, Kane Natural Area, and Merhof Pond). On each 100 min survey we counted insects in 5 m of vegetation either side of a dirt road 1000 m long and divided in 10 equal segments. We identified flora and ranked abundance of trees, shrubs, vines, and selected nectar plants by segment along the transects. We recorded 25 species of butterflies and 24 species of odonates on overall. All odonates and all but two butterfly species are native. We detected a mean of 82.8 insects per transect. Damselflies were common on two transects with abundant nearly-fresh water and virtually absent from the other three transects. Dragonfly abundance and species richness were negatively correlated with rank sums of woody vegetation, probably because adult odonates need sunny open areas. We found two possibly rare odonates, Needham's skimmer and big bluet. There were no strictly stream-associated odonates. Butterflies were mainly common species of open areas, a few common woodland species, and one possibly rare skipper. We observed butterflies nectaring at a variety of introduced and native flowers.

Many butterfly and odonate species are strong dispersers thus able to reach suitable habitats in urban areas. Butterfly diversity in the Meadowlands is limited by habitats and host plants, among other likely factors. Odonate diversity is limited by distribution of low salinity waters of good quality, and the absence of minimally-altered stream habitats. Butterfly and odonate diversity depends on proximity of wetland and undeveloped upland habitats. I recommend continuation of butterfly-odonate surveys using a larger number of transects and repeated surveys of individual transects. Improvement of wetland quality and protection of undeveloped uplands will help ensure future diversity of frogs and insects.